



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

11A

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/802,913	03/18/2004	Hiroshi Suzuki	1309.43669X00	5412

24956 7590 11/30/2006

MATTINGLY, STANGER, MALUR & BRUNDIDGE, P.C.
1800 DIAGONAL ROAD
SUITE 370
ALEXANDRIA, VA 22314

EXAMINER

AMRANY, ADI

ART UNIT PAPER NUMBER

2836

DATE MAILED: 11/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/802,913

Applicant(s)

SUZUKI ET AL.

Examiner

Adi Amrany

Art Unit

2836

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 October 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 and 11-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 15-17 is/are allowed.
- 6) ☒ Claim(s) 1-8, 11-14 and 18-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 October 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicants' arguments with respect to claims 1 and 11 have been considered but are moot in view of the new ground(s) of rejection.

Drawings

2. New drawings were received on October 23, 2006. These drawings are not accepted because they only contain the marked up copies of the figures (1, 4, 6-9 and 11). New drawings, without hand drawn corrections, are required.

Claim Objections

3. Claims 12, 14 and 17 are objected to because there is no basis for the term, "motherboard" (last line of each claim).

Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1 and 11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The limitations of the Fibre Channel (FC) and Serial

Art Unit: 2836

Advanced Technology Attachment (SATA) storage devices are improper claim subject matter because they are component specifications.

Applicants response included two articles detailing the types of storage devices. The first article ("Our Guide to Hard Disk Drive Types...") lists three models of ATA storage devices (ATA33, ATA 66, ATA100) and two models of FC storage devices (106MB/s and 1.06GB/s). The article further states the possibility of a forthcoming FC storage device, but does not provide a definite bandwidth standard.

The limitations of FC and SATA storage devices are indefinite because the standards for these devices are not under the control the applicants. Any changes, improvements, advancements, etc. will improperly alter and expand the scope of the claims.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-8, 11-14 and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oomori (2004/0003306), in view of Mizuno (US 5,838,891), and in view of Yagisawa (US 7,047,354).

With respect to claim 1, Oomori discloses a storage system (figure 1, item 11; paragraph 18), which can be connected to a host computer, having:

Art Unit: 2836

a plurality of storage devices (figure 1, item 114; paragraph 19) which store data from said host;

a plurality of housings in which said plurality of storage devices are mounted (figure 1, item 114);

a plurality of first power supplies (figure 1, item 21; paragraph 22) which supply a voltage to said plurality of storage devices, and;

Oomori does not expressly disclose:

A. at least one of said plurality of housings has a first voltage converter.

B. said storage devices are Fibre Channel (FC) or Serial Advanced Technology Attachment (SATA) storage devices and the first voltage converter has a FC/SATA converter.

A. Mizuno discloses a storage system connected to a host computer comprising a plurality of storage devices and a plurality of housings (figures 3, 6, item 6; column 5, lines 56-59). Mizuno further discloses at least one of said plurality of housings has a first voltage converter (column 8, lines 20-24).

Oomori and Mizuno are analogous because they are from the same field of endeavor, namely power supplies for computer storage systems. At the time of the invention by applicants, it would have been obvious to one skilled in the art to modify the Oomori storage system by configuring the DC/DC converter within the housing of the storage devices in order to allow the DC/DC converter to be specifically tailored to the corresponding storage device.

B. Yagisawa discloses a RAID system comprising a plurality of storage supplies (figure 1; column 1, lines 9-17; column 3, lines 49-53), wherein any of said plurality of storage devices is a Fibre Channel (FC) storage device (figure 1, items 301; column 3, lines 49-62; column 4, lines 4-8 and 15-19), and any other of said storage devices is a Serial Advanced Technology Attachment (SATA) storage device having a serial interface (figure 1, items 401; column 3, lines 49-62; column 4, lines 8-10 and 20-21). Yagisawa further discloses a FC/SATA converter (figure 2, item 206; column 4, lines 1-10 and 22-46).

Oomori, Mizuno and Yagisawa are analogous because they are from the same field of endeavor, namely storage system management.

At the time of the invention by applicants, it would have been obvious to combine the power system disclosed in Oomori and Mizuno with the data system disclosed in Yagisawa. The motivation for doing so would have been to power and communicate with a mixture of storage systems (Yagisawa, column 2, lines 55-57).

With respect to claim 2, Oomori further discloses said first voltage converter supplies power having said single voltage value to said storage device via a single power supply line (figure 1, single transmission line connecting power supply 21 and power converter 117; paragraph 26, lines 4-5).

With respect to claim 3, Oomori further discloses said plurality of first power supplies are AC/DC power supplies (figure 1, items 211-213; paragraph 22), said first

Art Unit: 2836

voltage converter is a DC/DC converter (figure 1, item 117; paragraph 21), and said first voltage value is higher than said single voltage value (paragraph 26).

With respect to claim 4, Mizuno discloses said plurality of storage devices incorporate internal voltage conversion circuits, as discussed above.

With respect to claim 5, Mizuno discloses power having one of the plurality of voltage values converted by said internal voltage conversion circuits is used to drive magnetic storage media of said storage devices, and power having another of said plurality of voltage values is used to drive interface logic circuit of said storage devices (column 8, lines 20-24).

With respect to claim 6, Oomori further discloses said first voltage converter receives power having a plurality of different voltage values and outputs power having said single voltage value (figure 3, items 31-33 and 117; paragraph 41).

With respect to claim 7, Mizuno discloses:

wherein any of said plurality of housings is a first housing (figure 6; topmost disk enclosure) having a first voltage converter; and

any of the other of said plurality of housings is a second housing (figure 6; nth disk enclosure) having a second voltage converter.

It would be obvious to one skilled in the art to configure the plurality of Mizuno DC/DC converters to output a different voltage level, as determined by the associated storage device.

With respect to claim 8, Oomori further discloses a motherboard is positioned between said first power supplies and said housings, and said first voltage converter is

Art Unit: 2836

connected, via said motherboard, to a power supply line connecting said storage device.

With respect to claim 11, Oomori discloses a storage system (figure 1, item 11; paragraph 18), comprising:

- a power supply circuit (figures 1, 4, item 21; paragraph 22) which outputs a single type of power having a single voltage value (figure 4, item 42; paragraph 26, lines 1-5);

- a main body (figures 1, 4, item 11; paragraph 18) having a main power supply line to transmit said single type of power output from said power supply circuit (inherent), a data transfer path for data transfer (figure 1, "motherboard", paragraph 20), and a plurality of pack connection sites (figure 1, connection between motherboard and item 114);

- a plurality of storage device packs (figure 1, items 114; paragraph 19) which can receive said single type of power from said main power supply line (paragraph 26, lines 5-8), which are each connected to said plurality of pack connection sites (figure 1, connection motherboard and items 114) on said main body so as to enable exchange of data with said data transfer path, and which can be removed from said pack connection sites;

- wherein each storage device pack comprises a physical storage device (figure 1, items 114) requiring the supply of one or more types of power each having a prescribed voltage level;

wherein the voltage level of said single type of power from said main power supply line is equal to or higher than the highest voltage level of said one or more types of power required by said physical storage device (page 2, paragraph 26).

Oomori does not expressly disclose:

A. each storage device pack comprises a power conversion circuit (figure 1, item 117; paragraph 21) which receives said single type of power from said main power supply line, converts said single type of power into said one or more types of power required by said physical storage device units, and outputs said converted one or more types of power to said physical storage device;

B. said storage devices are Fibre Channel (FC) or Serial Advanced Technology Attachment (SATA) storage devices and the first voltage converter has a FC/SATA converter.

A. Mizuno discloses a storage system comprising a plurality of storage devices packs (figures 3, 6, item 6; column 5, lines 56-59), wherein each pack comprises a power conversion circuit to supply one or more types of power (column 8, lines 20-24).

Oomori and Mizuno are analogous as discussed above.

B. Yagisawa discloses a RAID system comprising a plurality of storage supplies (figure 1; column 1, lines 9-17; column 3, lines 49-53), wherein any of said plurality of storage devices is a Fibre Channel (FC) storage device (figure 1, items 301; column 3,

Art Unit: 2836

lines 49-62; column 4, lines 4-8 and 15-19), and any other of said storage devices is a Serial Advanced Technology Attachment (SATA) storage device having a serial interface (figure 1, items 401; column 3, lines 49-62; column 4, lines 8-10 and 20-21).

Yagisawa further discloses a FC/SATA converter (figure 2, item 206; column 4, lines 1-10 and 22-46). Oomori, Mizuno and Yagisawa are analogous as discussed above.

With respect to claim 12, Mizuno further discloses:

said first type of storage device pack (figures 3,6, item 6) comprises a multiple-power-supply type physical storage device which requires the supply of a plurality of types of power each having a prescribed voltage level (column 8, lines 20-24); and

a power conversion circuit (item 6, "converter") which converts said single type of power from said main power line into the plurality of types of power required by said multiple-power-supply type physical storage device, and inputs said plurality of types of power to said multiple-power-supply type physical storage device; and

said second type of storage device pack (item 6) comprises a single-power-supply type physical storage device which requires the supply of one type of power having a prescribed voltage level; and

a power conversion circuit (item 6, "converter") which converts said single type of power from said main power line into the plurality of types of power required by said multiple-power-supply type physical storage device, and inputs said plurality of types of power to said multiple-power-supply type physical

storage device; and each type of storage device pack can be connected to any of said plurality of pack connection sites (figure 6, item 9; column 8, lines 14-19).

Mizuno discloses that each storage device pack contains its own unique and specially configured DC/DC converter. It would be obvious to one skilled in the art that a single-power level storage device would only require the associated DC/DC converter to output one voltage level.

With respect to claim 13, it would be obvious to one skilled in the art that a storage device pack that comprises a physical storage device and a DC/DC converter may comprises any number of internal power supply lines connecting the converter and storage device without affecting the compatibility of the storage device with the external pack connection sites.

With respect to claim 14, Mizuno discloses:

said first type of storage device pack comprises a first type of physical storage device (figures 3, 6, item 6, topmost disk) requiring the supply of a first type of power having a first voltage level (column 8, lines 20-24); and a power conversion circuit (item 6, "converter"); and

said second type of storage device pack comprises a second type of physical storage device (item 6, nth disk) requiring the supply of a second type of power having a second voltage level different from said first voltage level; and a power conversion circuit;

wherein each type of storage device pack can be connected to any of said plurality of pack connection sites (figure 6, item 9; column 8, lines 14-19).

Art Unit: 2836

As discussed above, it would be obvious to one skilled in the art to configure each DC/DC converter to supply the correct power, as required by its associated storage device.

With respect to claim 18, Oomori discloses a control circuit (figure 1, item 112; paragraph 19), and further discloses that each power conversion circuit comprises regulators (paragraph 39). It would be obvious to one skilled in the art that the Oomori system comprises a power supply control circuit which individually controls the turning-on and turning-off of said power conversion circuits. At the time of the invention by applicants, it would have been obvious to combine the control circuit disclosed in Oomori with the internal conversion circuits disclosed in Mizuno. The motivation for doing so would have been to supply the correct amount of power (full vs zero) to the storage devices.

With respect to claim 19, and as discussed above, Oomori discloses a control circuit and that each power conversion circuit comprises regulators. It would be obvious to one skilled in the art that the Oomori system comprises a power supply control circuit which individually controls the output voltage levels of said power conversion circuits according to the power supply voltage levels required by each of said physical storage devices within said plurality of storage device packs. At the time of the invention by applicants, it would have been obvious to combine the control circuit disclosed in Oomori with the internal conversion circuits disclosed in Mizuno, in order to supply the correct amount of power to the storage devices.

Art Unit: 2836

With respect to claim 20, Oomori further discloses said physical storage device is a hard disk drive (figure 1, item 114; paragraph 19).

Allowable Subject Matter

8. Claims 15-17 are allowed, as applicants have rewritten the claims to include the limitations of original independent claim 11. As noted above, the objection to claim 17 has not been overcome.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a. Sase (US 2003/0231010) discloses a RAID configuration wherein each storage device pack comprises a DC/DC converter (figure 18; paragraph 90).


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Adi Amrany whose telephone number is (571) 272-0415. The examiner can normally be reached on weekdays, from 9am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Sircus can be reached on (571) 272-2800 x36. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2836

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AA



BRIAN SIRCUS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800